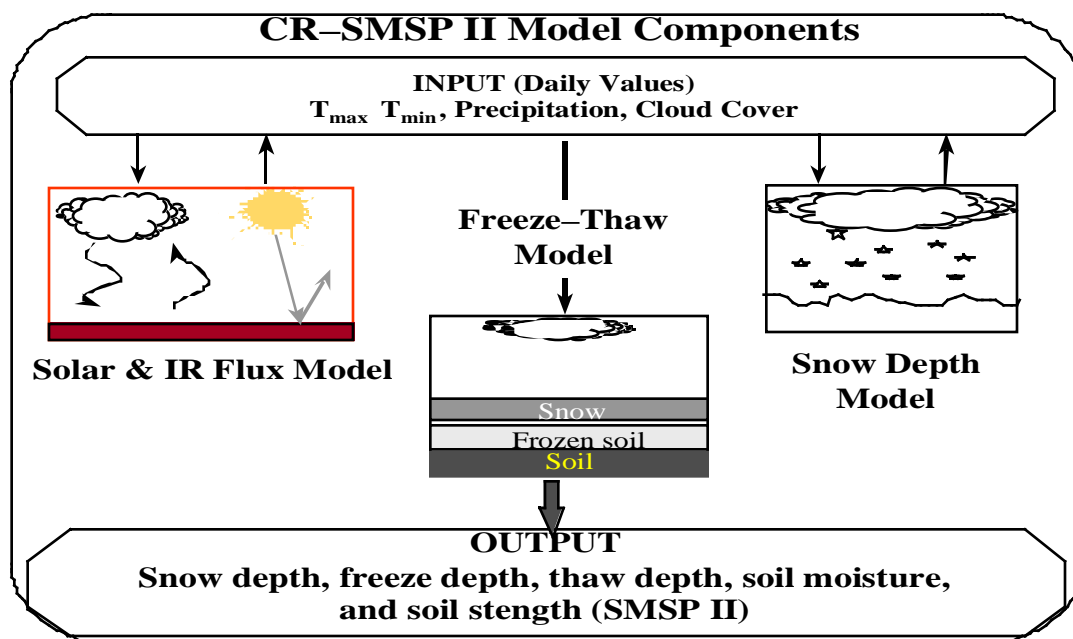# Fact Sheet

COLD REGIONS–SOIL MOISTURE STRENGTH PREDICTION (CR–SMSP II)

PROBLEM

During winter, the major soil factor influencing the movement of wheeled and tracked vehicles is the state of the ground (frozen or unfrozen) and snow cover. Thick frozen soil layers can support heavier and more frequent vehicle loads. A thin thawed layer overlying a thick frozen layer may not reduce the soil strength, but the increased moisture in the thawed layer may reduce traction and severely affect vehicle operations.

SOLUTION

The physics-based Cold Regions–Soil Moisture Strength Prediction model (CR–SMSP II) predicts the thickness of frozen/thawed layers, snow depth, soil strength, and soil moisture content for the thawed layers. Model inputs consist of a user-specified location and time of year and meteorological observations of the daily maximum and minimum temperature, precipitation, and cloud cover. CR–SMSP is designed to interact with SMSP developed for moderate climates so that the entire Corps of Engineers software package is applicable worldwide.

CR–SMSP II Model Components

INPUT (Daily Values)
T_{max} T_{min}, Precipitation, Cloud Cover

Solar & IR Flux Model

Freeze–Thaw Model

Snow
Frozen soil
Soil

Snow Depth Model

OUTPUT
Snow depth, freeze depth, thaw depth, soil moisture, and soil stength (SMSP II)

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